

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A latex obtainable obtained by reacting

- A) 30-90% by weight of at least one ethylenically unsaturated monomer;
- B) 70-10% by weight of a diene;
- C) 1-10% by weight of α,β -unsaturated carboxylic acids, carboxylic acid nitriles, carboxylic acid amides, or mixtures thereof; and

D) at least one of an auxiliary, at least one and an additive or mixtures thereof;

~~wherein a sum of A, B and C is 100% by weight % by weight is based on the total weight of A, B and C;~~

wherein said reacting follows a gradient regime for components A and B;

wherein, in said gradient regime, an amount added per unit time of one of components A or B continuously increases, while simultaneously an amount added per unit time continuously decreases for one of components A or B which does not undergo the continuous increase;

with the proviso that a starting molar ratio of A to B is adjusted from a range of 0.15 - 0.95 or 1.05 - 6.66 through at least one discontinuous change in the amount added per unit time to a target molar ratio of A to B, in the range of 1.05 – 6.66 or 0.15 – 0.95, and thereafter the change in the amount added per unit time is made

- i) constantly for A and B, and/or
- ii) decreasingly for A and ascendingly for B, and/or
- iii) decreasingly for B and ascendingly for A,

in any sequence, individually or in combination.

Claim 2 (Original): The latex as claimed in claim 1, wherein component A is selected from the group consisting of C₂ to C₂₀ alkenes, functionalized vinyl compounds, C₅ to C₂₀ alkadienes having isolated double bonds, C₅ to C₂₀ alkatrienes having isolated double bonds, C₅ to C₂₀ cycloolefins, vinyl-substituted aromatics, α,β -monoethylenically unsaturated carboxylic acids, nitriles of α,β -monoethylenically unsaturated carboxylic acids, amides of α,β -monoethylenically unsaturated carboxylic acids, anhydrides of α,β -monoethylenically unsaturated carboxylic acids, C₁ to C₂₀ alkyl esters of acrylic acid, C₁ to C₂₀ alkyl esters of methacrylic acid, C₆ to C₂₀ aryl esters of acrylic acid and C₆ to C₂₀ aryl esters of methacrylic acid.

Claim 3 (Original): The latex as claimed in claim 2, wherein component A comprises vinyl aromatics.

Claim 4 (Original): The latex as claimed in claim 3, wherein component A comprises styrene.

Claim 5 (Original): The latex as claimed in claim 1, wherein component B is selected from the group consisting of C₄ to C₂₀ dienes having conjugated double bonds.

Claim 6 (Original): The latex as claimed in claim 1, wherein component B comprises butadiene.

Claim 7 (Original): The latex as claimed in claim 1, wherein component C is selected from the group consisting of C₃ to C₆ α,β -monoethylenically unsaturated monocarboxylic acids, C₃ to C₆ α,β -monoethylenically unsaturated dicarboxylic acids, esters

of C₃ to C₆ α,β -monoethylenically unsaturated monocarboxylic acids with C₁ to C₁₂ alkanols, esters of C₃ to C₆ α,β -monoethylenically unsaturated dicarboxylic acids with C₁ to C₁₂ alkanols, amides of C₃ to C₆ α,β -monoethylenically unsaturated monocarboxylic acids, amides of C₃ to C₆ α,β -monoethylenically unsaturated dicarboxylic acids, nitriles of C₃ to C₆ α,β -monoethylenically unsaturated monocarboxylic acids, nitriles of C₃ to C₆ α,β -monoethylenically unsaturated dicarboxylic acids, anhydrides of C₃ to C₆ α,β -monoethylenically unsaturated monocarboxylic acids, and anhydrides of C₃ to C₆ α,β -monoethylenically unsaturated dicarboxylic acids.

Claim 8 (Original): The latex as claimed in claim 1, wherein component C comprises acrylic acid, acrylonitrile, acrylamide, methacrylic acid, itaconic acid or mixtures thereof.

Claim 9 (Currently Amended): The latex as claimed in claim 1, wherein ~~at least one of components~~ D is at least one selected from the group consisting of surface-active substances, initiators, molecular weight regulators, pH regulators, complexing agents, and mixtures thereof.

Claim 10 (Original): The latex as claimed in claim 1, wherein before the beginning of said gradient regime a portion of components A and B is metered in with constant linearity.

Claim 11 (Original): The latex as claimed in claim 1, wherein, before said starting molar ratio of A to B or said target molar ratio of A to B is reached, the gradient regime operates without or with single or multiple reversal of a change in the amount added per unit time of A and B.

Claim 12 (Original): The latex as claimed in claim 1, wherein there are two, three or four discontinuous changes in the amount added per unit time.

Claim 13 (Original): The latex as claimed in claim 1, wherein said reacting takes place at a temperature of from 5 to 130°C; and

wherein said temperature is constant during said reacting; or
wherein said temperature varies during said reacting.

Claim 14 (Original): The latex as claimed in claim 1, wherein component C is run in with a constant and/or with a decreasing and/or an increasing change in the amount added per unit time and any desired combinations thereof and dependently or independently of the amount added per unit time of components A and B.

Claim 15 (Original): The latex as claimed in claim 1, wherein component D is run in with a constant and/or with a decreasing and/or an increasing change in the amount added per unit time and any desired combinations thereof and dependently or independently of the amount of components A and B added per unit time.

Claim 16 (Currently Amended): A process for preparing a latex, comprising:
reacting

- A) 30-90% by weight of at least one ethylenically unsaturated monomer;
- B) 70-10% by weight of a diene;
- C) 1-10% by weight of α,β -unsaturated carboxylic acids, carboxylic acid nitriles, carboxylic acid amides, or mixtures thereof; and
- D) at least one of an auxiliary, ~~at least one and an~~ additive ~~or mixtures thereof~~,

~~wherein a sum of A, B and C is 100% by weight % by weight is based on the total weight of A, B and C;~~

wherein said reacting follows a gradient regime for components A and B;

wherein, in said gradient regime, an amount added per unit time of one of components A or B continuously increases, while simultaneously an amount added per unit time continuously decreases for one of components A or B which does not undergo the continuous increase;

with the proviso that a starting molar ratio of A to B is adjusted from a range of 0.15 - 0.95 or 1.05 - 6.66 through at least one discontinuous change in the amount added per unit time to a target molar ratio of A to B, in the range of 1.05 - 6.66 or 0.15 - 0.95, and thereafter the change in the amount added per unit time is made

- i) constantly for A and B, and/or
 - ii) decreasingly for A and ascendingly for B, and/or
 - iii) decreasingly for B and ascendingly for A,
- in any sequence, individually or in combination.

Claim 17 (Original): The process according to claim 16, wherein component A is selected from the group consisting of C₂ to C₂₀ alkenes, functionalized vinyl compounds, C₅ to C₂₀ alkadienes having isolated double bonds, C₅ to C₂₀ alkatrienes having isolated double bonds, C₅ to C₂₀ cycloolefins, vinyl-substituted aromatics, α,β -monoethylenically unsaturated carboxylic acids, nitriles of α,β -monoethylenically unsaturated carboxylic acids, amides of α,β -monoethylenically unsaturated carboxylic acids, anhydrides of α,β -monoethylenically unsaturated carboxylic acids, C₁ to C₂₀ alkyl esters of acrylic acid, C₁ to C₂₀ alkyl esters of methacrylic acid, C₆ to C₂₀ aryl esters of acrylic acid and C₆ to C₂₀ aryl esters of methacrylic acid.

Claim 18 (Original): The process according to claim 16, wherein component A comprises vinyl aromatics.

Claim 19 (Original): The process according to claim 16, wherein component A comprises styrene.

Claim 20 (Original): The process according to claim 16, wherein component B is selected from the group consisting of C₄ to C₂₀ dienes having conjugated double bonds.

Claim 21 (Original): The process according to claim 16, wherein component B comprises butadiene.

Claim 22 (Original): The process according to claim 16, wherein component C is selected from the group consisting of C₃ to C₆ α,β -monoethylenically unsaturated monocarboxylic acids, C₃ to C₆ α,β -monoethylenically unsaturated dicarboxylic acids, esters of C₃ to C₆ α,β -monoethylenically unsaturated monocarboxylic acids with C₁ to C₁₂ alkanols, esters of C₃ to C₆ α,β -monoethylenically unsaturated dicarboxylic acids with C₁ to C₁₂ alkanols, amides of C₃ to C₆ α,β -monoethylenically unsaturated monocarboxylic acids, amides of C₃ to C₆ α,β -monoethylenically unsaturated dicarboxylic acids, nitriles of C₃ to C₆ α,β -monoethylenically unsaturated monocarboxylic acids, nitriles of C₃ to C₆ α,β -monoethylenically unsaturated dicarboxylic acids, anhydrides of C₃ to C₆ α,β -monoethylenically unsaturated monocarboxylic acids, and anhydrides of C₃ to C₆ α,β -monoethylenically unsaturated dicarboxylic acids.

Claim 23 (Original): The process according to claim 16, wherein component C comprises acrylic acid, acrylonitrile, acrylamide, methacrylic acid, itaconic acid or mixtures thereof.

Claim 24 (Currently Amended): The process according to claim 16, wherein ~~at least one of component D is at least one~~ selected from the group consisting of surface-active substances, initiators, molecular weight regulators, pH regulators, complexing agents, and mixtures thereof.

Claim 25 (Original): The process according to claim 16, wherein said reacting takes place at a temperature of from 5 to 130°C.

Claim 26 (Original): An article coated with the latex according to claim 1.

Claim 27 (New): The latex according to claim 1, wherein 4-phenylcyclohexene is present in an amount of from 58 to 63 ppm.

Claim 28 (New): The latex according to claim 1, wherein 4-phenylcyclohexene is present in an amount of 58 ppm or less.

BASIS FOR THE AMENDMENT

Claims 1-28 are active in the present application. Claims 16-25 are allowed claims. Independent Claims 1 and 16 have been amended for matters of form not effecting the scope of the claimed subject matter. Independent Claim 1 has been amended in the preamble to recite a “latex composition”. Claims 27 and 28 are new claims supported in the examples. The specification has been amended for matters of form.

No new matter is added.

REQUEST FOR RECONSIDERATION

Applicants thank Examiner Poulos and the Examiner's Supervisor Mr. Vasu Jagannathan for the helpful and courteous discussion of January 10, 2006.

The Office objected to Claims 1 and 16 on the grounds that the basis for percent by weight is not clear in the original claims. Claims 1 and 16 have been amended to state that percent by weight is based upon the total weight of components A), B), and C). Support for the amendment is found in the original claims wherein it is stated that a sum of A), B) and C) is 100% by weight.

While interpreting the claims the Examiner assumed that component D) is required. This is correct. Component D) may be a component such as an initiator, which may, in some cases, be a necessary component in order to start (e.g., initiate) a reaction (e.g., a polymerization reaction of ethylenically unsaturated monomers).

The Examiner further stated in the first paragraph of page 4 of the Office Action that the independent claims of the present application are "open" claims. This is correct. Nothing in the language of the claims excludes additional monomer units or any other component not explicitly recited or otherwise explicitly excluded from the original claims.

The Office objected to Claims 14 and 15 stating "it is unclear how component C or D can simultaneously or concurrently be constant, increasing, and decreasing." Applicants submit that there is no requirement in the cited claims that components C and/or D must simultaneously be constant, increasing or decreasing. Instead, component C and/or D may be run-in at a constant, increasing or decreasing manner at some point during the reacting. Thus, at one stage during the reacting any one of C and D may be run-in at a constant rate. At a different stage during the reacting the component may be run-in at an increasing rate. At a further different stage during the reacting the component may be run-in at a decreasing rate.

Applicants disclose that the products formed from emulsion polymerizations may contain an undesirable contaminant such as 4-phenylcyclohexene (see page 1, lines 14-17 and page 2, lines 6-8). Undesired side products such as 4-phenylcyclohexene (i.e., 4-PCH) may impart a strong odor to a latex obtained by emulsion polymerization. Applicants demonstrate that the latex composition obtained in the manner recited in the present claims is different from prior art latex compositions (e.g., latex compositions obtained in a manner that does not require the change or adjustment in the molar ratio of components A and B as presently claimed) by providing factual evidence in the examples of the original specification. As is evident from a comparison of Comparative Example 1 with Inventive Examples 1 and 2, a polymerization reaction that is carried out according to the limitations of the present claims provides a latex composition having a lower amount of 4-PCH. The same is also observed in a comparison of Comparative Example 2 and Inventive Example 3. Thus, Applicants have demonstrated that the product-by-process limitation of the present claims defines a product (i.e., a latex composition) that is different from latex compositions prepared by polymerizations carried out in a manner that does not adhere to the present claim limitations.

When comparing Comparative Example 1 with Example 2, a reduction in the amount of 4-PCH of 11 ppm (i.e., 16%) is achieved. Comparing Example 2 with Example 3 shows a reduction in 4-PCH of 12 ppm (also a 16% reduction).

4-PCH is a high boiling compound having a boiling of greater than 200° C. The removal of such a high-boiling compound from a latex is complicated by the fact that it may be entrained in an organic or polymer phase of the latex. Removal under reduced pressure is not an effective option because heating will remove the aqueous phase of the latex.

In comparison to unreacted styrene, it is about 30 times more difficult to remove 4-PCH. Thus, once 4-PCH is present in a latex composition its removal is very difficult. Any

reduction in the amount of 4-PCH is significant with respect to obtaining a latex polymer with a minimized odor of 4-PCH.

In summary, the latex polymer of the claimed invention is different from the prior art latex polymer because it is made by a process that reduces the amount of 4-PCH present therein. Importantly, while having a reduced amount of the undesirable 4-PCH component, the latex of the present claims is able to maintain those properties which are desirable in latexes.

Applicants submit the amendment to the claims obviates the objections and/or rejections under 35 U.S.C. § 112.

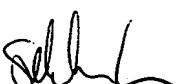
Thus, the presently claimed latex composition of Claims 1-15 and 25 is novel and not obvious in view of the cited prior art. Applicants respectfully request withdrawal of the rejection and allowance of all now-pending claims.

Respectfully submitted,

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